UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/796,274	03/10/2004	Paul Rich	WLJ.103	9386

7590 06/29/2005

VOLENTINE FRANCOS, P.L.L.C.
Suite 150
12200 Sunrise Valley Drive
Reston, VA 20191

EXAMINER	
ESTRADA, MICHELLE	
ART UNIT	**PAPER NUMBER**
2823	

DATE MAILED: 06/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/796,274	RICH ET AL.	
	Examiner	Art Unit	
	Michelle Estrada	2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 April 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3,5-11 and 13-15* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *7,11 and 15* is/are allowed.

6)☒ Claim(s) *1-3,5,6,8-10,13 and 14* is/are rejected.

7)☒ Claim(s) *2 and 3* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

Claims 2 and 3 are objected to because of the following informalities:

In claim 2, line 2, it appears that "mT" should be replaced with --mTorr--.

In claim 3, line 2, it appears that "mT" should be replaced with --mTorr--.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-3, 5, 6 and 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kitakado et al. (6,709,902) in view of the following comments.

With respect to claim 1, Kitakado et al. disclose a method of sputtering a tungsten-containing film from a tungsten target (Col. 14, lines 43-45) onto a semiconductor wafer including using krypton or xenon as a sputter gas (Col. 1, lines 65-68).

With respect to claim 8, Kitakado et al. disclose a method of sputtering a tungsten-containing film from a tungsten target (Col. 14, lines 43-45) onto a semiconductor wafer including using krypton or xenon as a sputter gas (Col. 1, lines 65-

68), wherein the sputtering is reactive sputtering, the sputter gases includes nitrogen and the film deposited is tungsten nitride (Col. 14, lines 45-53).

With respect to claim 9, Kitakado et al. disclose wherein the sputter gases further include argon (Col. 14, lines 49-53).

With respect to claim 10, Kitakado et al. disclose wherein the ratio of argon to krypton or xenon is selected to minimize stress in the deposited film (Col. 14, lines 50-53).

Kitakado et al. does not disclose wherein the deposition takes place in a vacuum chamber with a krypton pressure of less than 10 mTorr; wherein the krypton pressure is less than 6 mTorr; wherein the power supplied to the target is greater that about 3.5 watts per cm^2; and wherein the wafer is placed on a platen during the deposition and the platen temperature is between 200 °C and 400 °C.

One of ordinary skill in the art would have been led to the recited krypton pressure, power and temperature through routine experimentation to achieve a desired rate of annealing. See MPEP 2144.05. In addition, the selection of the krypton pressure, power and temperature, its obvious because it is a matter of determining optimum process conditions by routine experimentation with a limited number of species of result effective variables. These claims are prima facie obvious without showing that the claimed ranges achieve unexpected results relative to the prior art range. In re Woodruff, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also In re Huang, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996)(claimed ranges or a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and

unexpected result which is different in kind and not merely in degree from the results of the prior art). See also In re Boesch, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill or art) and In re Aller, 105 USPQ 233 (CCPA 1995) (selection of optimum ranges within prior art general conditions is obvious).

Note that the specification contains no disclosure of either the critical nature of the claimed krypton pressure, power and temperature or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen krypton pressure, power and temperature or upon another variable recited in a claim, the Applicant must show that the chosen krypton pressure, power and temperature are critical. *In re Woodruf*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

The resistivity of the tungsten film is expected to be less than 11 μohm cm since is the same process as recited in claim 1 and the process parameters are optimizable.

Claims 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taguwa (6,800,543) in view of Matsumoto et al. (6,451,690).

With respect to claim 14, Taguwa discloses a method of forming a tungsten/tungsten nitride (16/17) stack on a wafer including sputtering a tungsten nitride film (16) on a wafer and sputtering a tungsten film (17) on the tungsten nitride film (Col. 5, lines1-65); wherein the tungsten nitride film is deposited by reactive sputtering and the sputter gases include nitrogen (Col. 5, lines 20-32).

Taguwa does not specifically disclose wherein the two sputtering processes are performed in a single chamber using a single target.

Matsumoto et al. dislcose a method of forming metal film by sputtering method; wherein the metal films can be continuously formed by using the same target placed in the same chamber by merely changing the kind of gas to be used for the sputtering (Col. 5, lines 33-36).

It would have been within the scope of one of ordinary skill in the art to combine the teachings of Taguwa and Matsumoto et al. to use the same target and chamber in the sputtering processes of Matsumoto et al. to be performed in the process of Taguwa because using the same target placed in the same chamber improves the throughput.

Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kitakado et al. as applied to claims 1-3, 5, 6 and 8-10 above, and further in view of Taguwa (6,800,543) in view of Matsumoto et al. (6,451,690).

Kitakado et al. do not disclose forming a tungsten/tungsten nitride stack on a wafer including sputtering tungsten nitride film on a wafer and sputtering a tungsten film on the tungsten nitride film wherein the two sputtering processes are performed in a single chamber using a single target.

Taguwa discloses a method of forming a tungsten/tungsten nitride (16/17) stack on a wafer including sputtering a tungsten nitride film (16) on a wafer and sputtering a tungsten film (17) on the tungsten nitride film (Col. 5, lines1-65); wherein the tungsten

nitride film is deposited by reactive sputtering and the sputter gases include nitrogen (Col. 5, lines 20-32).

Taguwa does not specifically disclose wherein the two sputtering processes are performed in a single chamber using a single target.

Matsumoto et al. dislcose a method of forming metal film by sputtering method; wherein the metal films can be continuously formed by using the same target placed in the same chamber by merely changing the kind of gas to be used for the sputtering (Col. 5, lines 33-36).

It would have been within the scope of one of ordinary skill in the art to combine the teachings of Kitakado et al., Taguwa and Matsumoto et al. to use the same target and chamber in the sputtering processes of Matsumoto et al. to be performed in the process of Taguwa because using the same target placed in the same chamber improves the throughput.

Allowable Subject Matter

Claims 7, 11 and 15 are allowed.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Estrada whose telephone number is 571-272-1858. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 571-272-1855. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 571-272-2800.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

George Fourson
Primary Examiner
Art Unit 2823

MEstrada
June 14, 2005